IN THE CLAIMS:

Please substitute the following claims for the previous claims.

1. (previously presented) A substrate processing apparatus comprising:

a process chamber capable of processing a substrate, the substrate having overlying and underlying materials;

a radiation source outside the process chamber, the radiation source capable of providing non-polarized radiation that is at least partially reflected from the substrate in the chamber;

an interferometric radiation detector to detect the reflected radiation and generate an interferometric signal; and

a controller to

(i) receive the interferometric signal,

(ii) calculate a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) determine a property of the overlying or underlying material on the substrate in the chamber based on the calculated dynamic variance of the interferometric signal.

2-6. (cancelled)

7. (previously presented) An apparatus according to claim 1 wherein the controller determines both an onset and completion of processing of a plurality of materials on the substrate based on the calculated dynamic variance of the interferometric signal.

8. (previously presented) A method of processing a substrate in a process zone, the method comprising the steps of:

(a) placing the substrate in the process zone, the substrate having overlying and underlying materials;

(b) directing non-polarized radiation onto the substrate from a radiation source outside the process zone;

(c) detecting the non-polarized radiation reflected from the substrate before, during, or after processing of the substrate and generating an interferometric signal;

(d) calculating a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point; and

(e) determining a property of the overlying or underlying material on the substrate in the process zone from the dynamic variance of the interferometric signal.

9. (original) A method according to claim 8 comprising determining the thickness of the underlying material on the substrate from the dynamic variance of the reflected radiation.

10-12. (cancelled)

13. (previously presented) A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

(b) a radiation source outside the chamber, the radiation source capable of providing non-polarized radiation that is at least partially reflected from the substrate in the chamber;

(c) an interferometric radiation detector to detect the reflected radiation and generate a an interferometric signal; and

(d) a computer having a memory capable of operating a computer-readable program embodied on a computer-readable medium, the computer readable program including program code to

(i) receive the interferometric signal,

(ii) calculate a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) determine a property of the overlying or underlying material on the substrate in the chamber from the dynamic variance of the interferometric signal.

14. (original) An apparatus according to claim 13 wherein the program code is adapted to determine (i) a thickness of the underlying material or (ii) a dopant level of the overlying material from the dynamic variance of the reflected radiation.

15-22. (cancelled)

23. (previously presented) A substrate processing apparatus comprising:

a process chamber capable of processing a substrate in a plasma;

a radiation source outside the chamber;

a plasma emission radiation detector to detect a radiation emission originating from the plasma and generate a plasma emission signal over time, and an interferometric radiation detector to detect a radiation originating from the radiation source and reflected from the substrate and generate an interferometric signal over time; and

a controller to receive and evaluate the plasma emission and interferometric signals to determine a process endpoint.

24. (previously presented) An apparatus according to claim 23 wherein the controller evaluates the plasma emission and interferometric signals to determine an event in the chamber or a property of a material on the substrate.

25. (previously presented) An apparatus according to claim 23 wherein the controller evaluates the plasma emission and interferometric signals to determine an onset of processing of a material on the substrate.

26. (previously presented) An apparatus according to claim 25 wherein the controller is evaluates the plasma emission and interferometric signals to determine an onset of processing of an underlayer while an overlayer is being processed.

27. (previously presented) An apparatus according to claim 23 wherein the controller combines the plasma emission and interferometric signals.

28. (previously presented) An apparatus according to claim 23 wherein the controller evaluates a derivative of the plasma emission and interferometric signals.

29. (cancelled)

30 (previously presented) An apparatus according to claim 23 wherein the controller detects both an onset and completion of processing of a material on the substrate.

31. (previously presented) A method of processing a substrate in a process zone, the method comprising the steps of:

(a) placing the substrate in the process zone;

(b) setting process conditions in the process zone to form a plasma to process the substrate;

(c) detecting a radiation emission originating from the plasma and generating a plasma emission signal over time;

(d) detecting a radiation reflected from the substrate and generating an interferometric signal over time; and

(e) evaluating the plasma emission and interferometric signals to determine the occurrence of an event in the process zone or a property of a material on the substrate.

32. (previously presented) A method according to claim 31 comprising evaluating the plasma emission and interferometric signals to determine an onset of processing of a material on the substrate.

33. (previously presented) A method according to claim 31 comprising evaluating the plasma emission and interferometric signals to determine an onset of processing of an underlayer while an overlayer is being processed.

34. (previously presented) A method according to claim 31 comprising combining the plasma emission and interferometric signals.

35. (previously presented) A method according to claim 31 comprising determining a derivative of the plasma emission and interferometric signals.

36. (previously presented) A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate in a plasma;

(b) a radiation source outside the chamber;

(c) a plasma emission radiation detector to detect a radiation emission originating from the plasma and generate a plasma emission signal over time, and an interferometric radiation detector to detect radiation originating from the radiation source and reflected from the substrate and generate an interferometric signal over time; and

(d) a computer having a memory capable of operating a computer-readable program embodied on a computer-readable medium, the computer readable program including program code to receive the plasma emission and interferometric signals and determine an event in the chamber or a property of a material on the substrate.

37. (original) An apparatus according to claim 36 wherein the program code determines a property of the material from a change in amplitude of the radiation.

38-77 (cancelled)

78. (previously presented) A substrate processing apparatus comprising:

a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

a radiation source outside the chamber capable of providing radiation that is at least partially reflected from a substrate in the chamber;

an interferometric radiation detector to detect the reflected radiation and generate an interferometric signal; and

a controller to

(i) receive the interferometric signal,

(ii) calculate a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) evaluate the dynamic variance of the interferometric signal in relation to a calculated or stored range of dynamic variances of the signal for a plurality of substrates to determine a property of the overlying or underlying material of the substrate.

79. (previously presented) An apparatus according to claim 78 wherein the controller evaluates the dynamic variance to determine if the dynamic variance is within the calculated or stored range.

80. (previously presented) An apparatus according to claim 78 wherein the controller provides an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, in response to the evaluation of the dynamic variance.

81. (previously presented) An apparatus according to claim 78 wherein the controller provides an instruction signal at the beginning of processing of the substrate.

82. (previously presented) An apparatus according to claim 78 wherein the controller evaluates a change in the dynamic variance of the amplitude.

83. (previously presented) A method of processing a substrate in a process zone, the method comprising the steps of:

(a) placing the substrate in the process zone, the substrate having overlying and underlying materials;

(b) detecting radiation that originates from a radiation source outside the process zone and is reflected from the substrate before, during, or after processing of the substrate and generating an interferometric signal;

(c) calculating a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point; and

(d) evaluating the dynamic variance of the interferometric signal relative to a calculated or stored range of dynamic variances of amplitude of the interferometric signal for a plurality of substrates to determine a property of the overlying or underlying material of the substrate.

84. (currently amended) A method according to claim 83 wherein the step ~~(c)~~ (d) comprises determining if the dynamic variance is within the calculated or stored range.

85. (original) A method according to claim 83 further comprising the step of providing an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, in relation to the evaluation step.

86. (previously presented) A method according to claim 85 comprising providing the instruction signal to adjust process conditions at the beginning of processing of the substrate.

87. (previously presented) A method according to claim 83 comprising evaluating a change in the dynamic variance of the amplitude.

88. (previously presented) A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

(b) a radiation source outside the chamber, the radiation source capable of providing radiation that is at least partially reflected from the substrate during processing;

(c) an interferometric radiation detector to detect the reflected radiation and generate an interferometric signal; and

(d) a computer having a memory capable of operating a computer-readable program embodied on a computer-readable medium, the computer readable program including program code to

(i) receive the interferometric signal,

(ii) calculate a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) evaluate the dynamic variance of the interferometric signal in relation to a range of dynamic variances of the signal for a plurality of substrates to determine a property of the overlying or underlying material of the substrate.

89. (previously presented) An apparatus according to claim 88 wherein the program code evaluates the dynamic variance to determine if the dynamic variance is within the range.

90. (previously presented) An apparatus according to claim 88 wherein the program code provides an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, in response to the evaluation of the dynamic variance.

91-101. (cancelled)

102. (previously presented) A substrate processing apparatus comprising:

a chamber capable of processing a substrate, the substrate having overlying and underlying materials;

a radiation source outside the chamber, the radiation source capable of providing radiation that is at least partially reflected from the substrate in the chamber;

an interferometric radiation detector to detect the reflected radiation and generate an interferometric signal;

a controller to

(i) receive the interferometric signal,

(ii) calculate a dynamic variance within a predefined time period of the interferometric signal by subtracting an intensity value at a minimum point from an intensity value at a maximum point, and

(iii) generate a set of data from the dynamic variance relating to a property of the overlying or underlying material of the substrate; and

a factory automation host computer to receive and evaluate the data, and control the processing of the substrate in relation to the data.

103. (original) An apparatus according to claim 102 wherein the factory automation host computer comprises a software program for substrate evaluation, process evaluation or process control.

104. (previously presented) An apparatus according to claim 103 wherein the software program evaluates the data to determine statistical process control parameters.

105. (previously presented) An apparatus according to claim 102 wherein the factory automation host computer provides an instruction signal to remove the substrate from the chamber, end processing, or adjust process conditions, upon a determination of an unsuitable property of the substrate or an unsuitable process parameter.

106. (previously presented) An apparatus according to claim 105 wherein the factory automation host computer provides the instruction signal to adjust process conditions at the beginning or end of processing of the substrate.

107. (previously presented) A substrate processing apparatus comprising:

a process chamber capable of processing a substrate, the substrate having overlying and underlying materials;

a radiation source capable of providing non-polarized radiation that is at least partially reflected from the substrate in the chamber;

a radiation detector to detect the reflected radiation and generate a signal trace; and

a controller to receive the signal trace and determine a property of the overlying or underlying material of the substrate in the chamber by determining whether the values of a sequence of slopes over time of the signal trace are substantially similar to the values of a sequence of preprogrammed slopes.

108. (previously presented) A method of processing a substrate in a process zone, the method comprising the steps of:

(a) placing the substrate in the process zone, the substrate having overlying and underlying materials;

(b) detecting radiation reflected from the substrate before, during, or after processing of the substrate; and

(c) evaluating the detected radiation to determine a property of the overlying or underlying material of the substrate in the process zone by determining whether a sequence of values of the slope over time of an amplitude of the detected radiation are substantially similar to the values of a sequence of preprogrammed slopes.